

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau

(43) International Publication Date  
16 June 2005 (16.06.2005)

(10) International Publication Number  
**WO 2005/055543 A1**

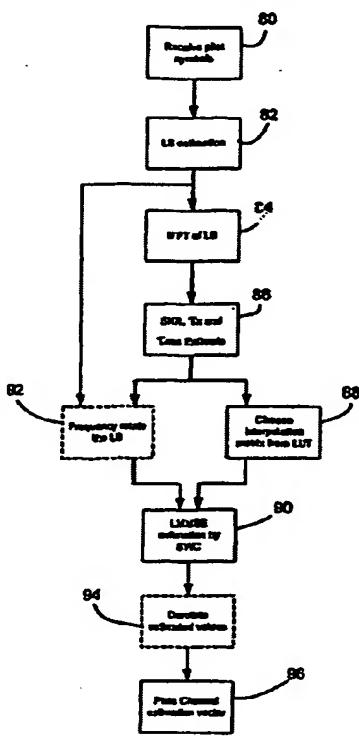
---

(31) International Patent Classification <sup>7</sup> :	H04L 27/26.	(72) Inventors; and
25/03		(75) Inventors/Applicants (for US only): FAULKNER, Michael [AU/AU]; 7 Athol Street, Moonee Ponds, VIC 3039 (AU). TOLOCHKO, Igor [AU/AU]; 21/28-32 Sturdee Parade, Dee Why, NSW 2099 (AU).
(21) International Application Number:	PCT/AU2004/001704	(74) Agent: FREEHILLS PATENT & TRADE MARK ATTORNEYS; Level 43, 101 Little Collins Street, Melbourne, VIC 3000 (AU).
(22) International Filing Date: 3 December 2004 (03.12.2004)		(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EG, ES, PL, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
(25) Filing Language:	English	
(26) Publication Language:	English	
(30) Priority Data:	2003906690 3 December 2003 (03.12.2003) AU	
(71) Applicant (for all designated States except US): AUSTRALIAN TELECOMMUNICATIONS COOPERATIVE RESEARCH CENTRE [AU/AU]; Curtin University of Technology, Building 314, Room 127, Wark Avenue, Bentley, W.A. 6012 (AU).		

*[Continued on next page]*

---

(54) Title: CHANNEL ESTIMATION FOR OFDM SYSTEMS



The flowchart illustrates the process for channel estimation in an OFDM system. It starts with 'Receive pilot symbols' (80), followed by 'LS estimation' (82). This leads to 'FFT of LS' (84), which then feeds into 'DFT, Delay and Time Estimate' (86). From there, two parallel paths emerge: one leading to 'Frequency domain LS' (82) and another to 'Choose Interpolation matrix from LS' (88). Both paths converge at 'LS/DFT information by SVC' (90). Finally, 'Observe information matrix' (94) and 'Pilot Channel information vector' (86) are produced.

(57) **Abstract:** A method for performing channel estimation in an orthogonal frequency-division multiplexing system, the method including the steps of: receiving (80) transmitting pilot symbols from a plurality of transmit antennas; forming (82) a least-squares estimation matrix from the transmitted pilot symbols; forming (84-88) a sparse smoothing matrix approximating a fixed weighting matrix, wherein each row vector in the sparse smoothing matrix contains one or more of the strongest weights in each row of the fixed weighting matrix; and (90) deriving a channel estimation matrix from the sparse smoothing matrix and the least-squares estimation matrix.

WO 2005/055543 A1